

E-BUSINESS SUITE APPLICATIONS 11i (11.5.10) BENCHMARK - USING ORACLE10g ON HEWLETT-PACKARD PROLIANT DL585 G5 AND BL685c SERVER BLADES

As a global leader in e-business applications, Oracle is committed to delivering high performance solutions that meet our customers' expectations. Business software must deliver rich functionality with robust performance. This performance must be maintained at volumes that are representative of customer environments.

Oracle benchmarks demonstrate our software's performance characteristics for a range of processing volumes in a specific configuration. Customers and prospects can use this information to determine the software, hardware, and network configurations necessary to support their processing volumes.

The primary objective of our benchmarking effort is to provide as many data points as possible to support this important decision.

SUMMARY OF RESULTS

| Online Workload | | |
|-------------------------|------------------|---|
| Number of Users | Avg. Resp. (Sec) | 90 th Percentile Response Time (Sec) |
| 2,100 Concurrent Users | 0.310 | 0.514 |
| Batch Workload | | |
| Order-to-Cash Batch | Time (Min) | Hourly Order Line Throughput |
| 50,000 Order/Inv. Lines | 25.84 | 116,099 Lines/Hour |
| Payroll Batch | Time (Min) | Hourly Employee Throughput |
| 10,000 Employees | 4.65 | 129,032 Empl./Hour |

Note that the online users and the two batch workloads were running simultaneously and the hourly throughput numbers mentioned above are linear extrapolations. Many factors can influence performance and your results may differ.

BENCHMARK PROFILE

In October 2008, Oracle and Hewlett-Packard conducted a benchmark in Cupertino, CA to measure the online and batch performance of the Oracle Applications Standard Benchmark processes in an environment running Oracle E-Business Suite 11i (11.5.10) with Oracle10g™ (10.2.0.3) for the Linux operating system on a Hewlett-Packard® ProLiant® DL585 G5 server configured with four quad-core processors (16-cores total), running Oracle® Enterprise Linux® 4 update 4.

Three 4-socket dual-core HP ProLiant BL685c server blades (8 cores per blade total), running Oracle® Enterprise Linux® 4 update 4 were used as application/web servers. One 4-socket dual-core HP ProLiant BL685c server blade was used as a Concurrent Manager server. A single HP Storage Works EVA6000 disk array was used for storage.

The benchmark measured the online user response times and the Order Management and Payroll batch business process hourly throughputs for a medium database model. Testing was conducted in a controlled environment with online users and the two batch processes running concurrently. **The goal of this Benchmark was to obtain reference response times and throughputs for Oracle E-Business Suite 11i Benchmark on HP servers running Linux.**

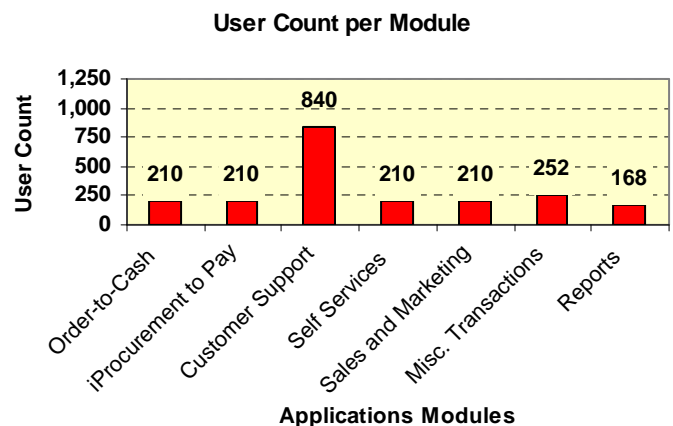


Figure 1: Oracle E-Business Suite Benchmark Concurrent User Distribution

BENCHMARK METHODOLOGY

E-Business Suite 11i Benchmark 11.5.10 online and batch processes can be initiated from a browser. For this benchmark, all runs used a browser to initiate the on-line user transactions and the batch processes were initiated as concurrent programs running simultaneously with the online users.

The batch workloads were run as standard concurrent processes via the concurrent manager.

Hewlett-Packard® LoadRunner® was used as the load driver, simulating concurrent users. It submitted transactions at an average rate of one every 2.5 – 15 minutes for each concurrent user.

Measurements were recorded on all of the servers when the user load was attained and the environment reached a steady state.

Figure 2 shows the configuration used for this benchmark run.

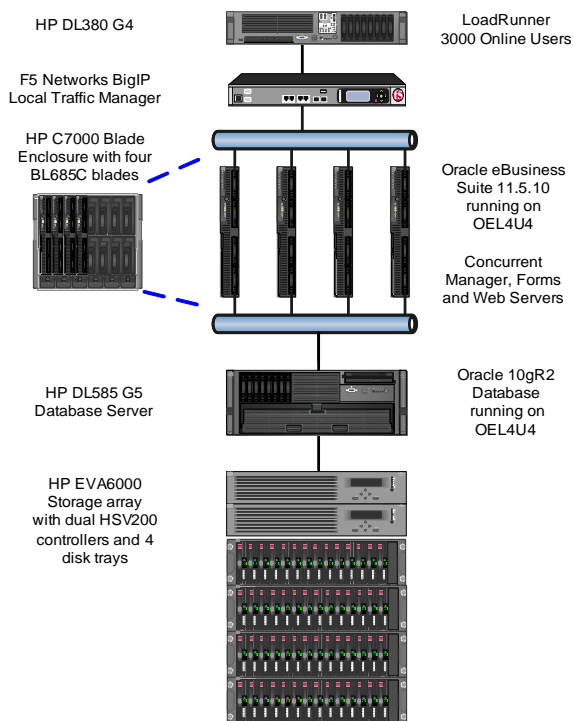


Figure 2: 3-Tier Configuration

This benchmark was run as a “Physical” 3-Tier configuration with discrete machines hosting all of the Database and Application server instances. The load across the multiple mid-tiers was balanced using an F5 Networks BIG-IP local traffic manager device.

BENCHMARK BUSINESS PROCESSES

The E-Business Suite benchmark consists of a mix of on-line transactions and batch processes running in parallel. The following table describes the on-line transactions included in the benchmark run.

| Oracle Application Product Flow | % within App. | % Overall | Pacing in Min |
|------------------------------------|---------------|-----------|---------------|
| Order to Cash (10%) | | | |
| Create & Book Order | 40 | 4 | 5 |
| Pick Release | 20 | 2 | 2.5 |
| Ship Confirm / ITS | 20 | 2 | 2.5 |
| Receivables - Invoice | 20 | 2 | 2.5 |
| Procurement to Pay (10%) | | | |
| Create & Query Requisition | 20 | 2 | 3 |
| Auto-create & Approve PO | 20 | 2 | 3 |
| View Purchase Order | 20 | 2 | 3 |
| Create Invoice | 20 | 2 | 3 |
| Invoice Inquiry | 20 | 2 | 3 |
| Customer Service (40%) | | | |
| Create Service Request | 40 | 16 | 4 |
| Update Service Request | 40 | 16 | 4 |
| Close Service Request | 20 | 8 | 4 |
| Self Service (10%) | | | |
| Create & Query Cash Exp. | 20 | 2 | 6 |
| Create & Query C. Card Exp. | 20 | 2 | 6 |
| Create Project Timecard | 30 | 3 | 6 |
| View Employee Payslip | 30 | 3 | 6 |
| Sales & Marketing (10%) | | | |
| Sales Lead to Proposal | 40 | 4 | 3 |
| Opportunity to Quote | 20 | 2 | 10 |
| Sales Opportunity to Order | 20 | 2 | 10 |
| Opportunity to Sales Forecast | 20 | 2 | 7.5 |
| Miscellaneous Trans. (12%) | | | |
| AR View Customer Transact. | 16.7 | 2 | 7.5 |
| AR Customer Summary | 16.7 | 2 | 7.5 |
| FA Create & Query Asset | 16.7 | 2 | 7.5 |
| GL Create Journal Entry | 16.7 | 2 | 7.5 |
| INV View Item Attributes | 16.7 | 2 | 7.5 |
| INV Insert Misc. Transactions | 16.7 | 2 | 7.5 |
| Reports (8%) | | | |
| AR – Aging Report | 25 | 2 | 15 |
| INV – Min/Max Inventory Rep. | 25 | 2 | 15 |
| OM – Order Summary Report | 25 | 2 | 15 |
| PO – Printed PO Report | 25 | 2 | 15 |
| | | 100% | |

Table 1: Online Transaction Mix

Batch Order-to-Cash Processes

| Business Process | Number of Threads Used |
|-----------------------|------------------------|
| High Vol. Order Proc. | 12 |
| Pick Release | 8 |
| Shipping Confirmation | 8 |
| ITS | 8 |
| Auto Invoice | 8 |
| Revenue Recognition | 8 |
| GL | 8 |

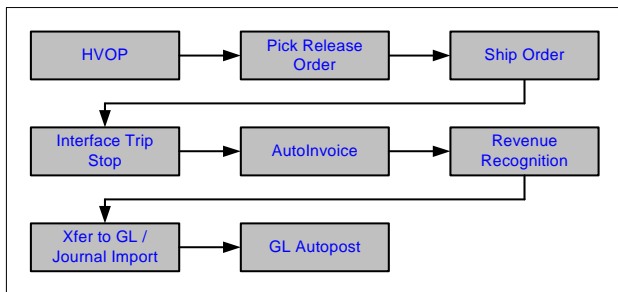


Figure 3: Order-to-Cash Process Flow

High Volume Order Processing (HVOP): The HVOP program processes orders by reading the rows from the Order Management Interface tables and converting the interface records into permanent order headers and their respective order lines. The orders are then booked and advanced to the shipping state.

Pick Release: Pick Release finds and release the eligible delivery lines that meet the release criteria, and creates move orders. The process of transacting move orders creates a reservation and determines the inventory source sub-inventory.

Ship Confirm: Ship Confirm is the process of confirming that items have shipped. When a delivery is ship-confirmed, Shipping Execution confirms that the delivery lines associated with the delivery have shipped.

Interface Trip Stop: The deliveries created in the previous step are then assigned to trips, which may involve multiple stops depending upon the shipping addresses of the deliveries. SRS has been modified to accept Organization code as a parameter and process the trip stops for the specified organization. Interface Trip Stop - SRS has also been enhanced to spawn multiple child processes to process trip stops in parallel. The parameter Stops per Batch is used to specify the number of stops to be processed by each thread of the Interface Trip Stop - SRS. Interface Trip Stop - SRS has also been enhanced to defer the Inventory Interface processes. In the E-Business Suite kit, this profile is set to Yes so that the Inventory Interface transactions are processed in the background by the Inventory transaction manager.

INV Material: The material transaction manager is configured to execute material transaction by periodic concurrent request submissions. The execution interval is set to 1 minute.

Auto-Invoice: The Auto-Invoice process is used to import invoices, credit memos, debit memos, and on-account credits. 'Receivables' ensures that the data imported is accurate and valid.

Revenue Recognition: Revenue Recognition program generates the revenue distribution records for the invoices and credit memos that use Invoicing and Accounting Rules. Accounting rules were assigned to recognize revenue over a 12-month accounting period. The Revenue Recognition program will create distribution records for the invoices and credit memos that are created in Receivables and imported using Auto-Invoice.

Transfer to General Ledger & Journal Import: The General Ledger Interface program transfers Receivables transaction accounting distributions to the general ledger interface table (GL_INTERFACE) and creates either detailed or summarized journal batches. "Receivables" creates un-posted journal entries in general ledger and executes Journal Import from Oracle General Ledger. It posts journal batches in Oracle General Ledger to update account balances.

General Ledger Auto-post: This posts journal batches to update the account balances of the detail and summary accounts. It can post actual budget or encumbrance journal batches.

Batch Payroll Processes

| Business Process | Number of Threads Used |
|------------------|------------------------|
| Payroll Process | 8 |
| PrePayments | 8 |
| NACHA | 8 |
| Check Writer | 8 |
| Costing | 8 |

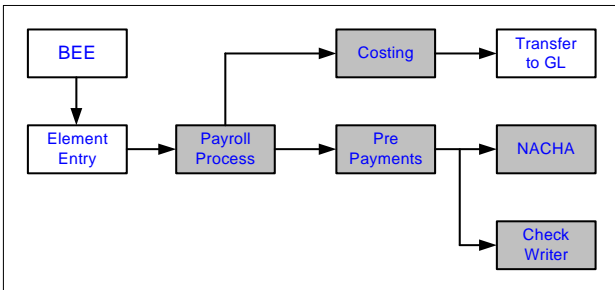


Figure 4: Payroll Process Flow

The Oracle E-Business Suite 11i Payroll processes tested are as follows:

Payroll Process: Identifies all employees to be processed and performs calculations required to complete the gross to net calculation including earnings, deductions, and taxes. The specific groups of employees processed can be controlled by multiple parameters to the payroll process including the ability for a user to define a rules based set of employees.

PrePayments: Distributes the net pay for each employee across the various payment methods (Direct Deposit, Check, or Cash). This can be run for a single payroll process or across multiple payroll processes.

NACHA: This is the US version of the Global Direct Deposit process which creates the bank interface file as per NACHA rules based on the rules in the Pre Payment process.

Check Writer: (Oracle Report Writer) This process allocates check numbers and creates/prints the payroll check and associated paper payslip.

Costing: This process associates the payroll transaction data with the General Ledger (GL) accounts in preparation for transfer of the data to GL. This process uses a sophisticated hierarchical rules based engine to determine the mapping of the HRMS data and payroll results to the GL accounts.

BENCHMARK RESULTS

| Online Workload | Avg. Resp. (Sec) | 90 th Percentile Response Time in Seconds |
|------------------------|------------------|--|
| 2,100 Concurrent Users | 0.310 | 0.514 |

Table 2: Online Overall Response Times

At least two checkpoints were completed during the measurement interval.

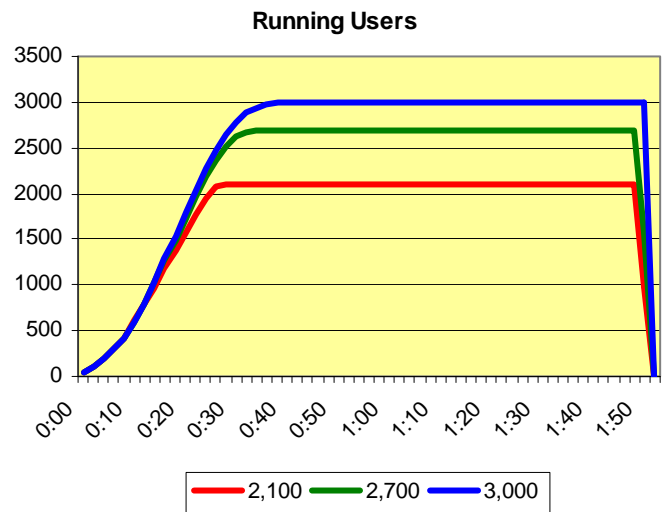


Figure 5: User Load Over Time: 70% Load = 2,100 Users, 90% Load = 2,700 Users and 100% Load = 3,000 Users

BENCHMARK RESULTS CONTINUED

| Batch Business Metrics | Achieved Output |
|--|-----------------|
| Order to Cash | |
| Number of Order Lines Created/Booked | 50,000 |
| Number of Order Lines Picked | 50,000 |
| Number of Order Lines Ship Confirmed | 50,000 |
| Number of Order lines Interface Trip Stopped | 50,000 |
| Number of Invoice Headers Created | 50,000 |
| Number of Invoice Lines Created | 100,000 |

Table 3a: Batch Transactions Completed (2,100 Users)

| Online Business Metrics | Achieved Output |
|--|-----------------|
| Order to Cash | |
| Number of Orders Created/Booked | 5,123 |
| Number of Orders Picked | 5,040 |
| Number of Orders Ship Confirmed | 5,040 |
| Number of Orders Interface Trip Stopped | 5,040 |
| Number of Invoice Headers Created | 5,040 |
| Number of Invoice Lines Created | 10,080 |
| Procurement to Pay | |
| Number of Requisitions Created | 837 |
| Number of Purchase Orders Created | 4,055 |
| Number of Purchase Orders Approved | 4,055 |
| Number of PO Invoices Created | 840 |
| Customer Support | |
| Number of Service Requests Created | 5,028 |
| Number of Service Requests Updated | 5,214 |
| Number of Service Requests Closed | 2,518 |
| Self-Service | |
| Number of Cash Expenses Created | 840 |
| Number of Credit Card Expenses Created | 840 |
| Number of Timecards Created | 630 |
| Sales & Marketing | |
| Number of Leads Converted to Proposal | 1,681 |
| Number of Leads Converted to Opportunities | 1,680 |
| Number of Opportunities Converted to Quotes | 505 |
| Number of Opportunities Converted to Orders | 252 |
| Miscellaneous Transactions | |
| Number of Fixed Assets Created | 336 |
| Number of GL Entries Created | 3,360 |
| Number of INV Miscellaneous Transactions Completed | 1,680 |
| Reports | |
| Number of AR Reports | 169 |
| Number of INV Reports | 168 |
| Number of OM Reports | 168 |
| Number of PO Reports | 168 |

Table 3b: Online Transactions Completed (2,100 Users)

| | 2,100 Users | |
|---------------------------|-------------|-----------------------|
| | Avg. | 90 th % |
| Order to Cash | | |
| Cr./Book Order | 0.92 | 1.07 |
| Pick Release | 0.37 | 0.41 |
| Ship Confirm | 0.22 | 0.23 |
| AR Insert Inv. | 0.48 | 0.51 |
| Procurement to Pay | | |
| Checkout req. | 0.27 | 0.32 |
| Submit Rq Data | 0.26 | 0.29 |
| Query Req. | 0.10 | 0.11 |
| Auto-create PO | 0.22 | 0.21 |
| Approve PO | 0.29 | 0.43 |
| View Purchase Order Find | 0.25 | 0.29 |
| Lines | 0.42 | 0.43 |
| Shipments | 0.39 | 0.43 |
| Distributions | 0.63 | 0.74 |
| Create AP Inv. | 0.24 | 0.32 |
| Inv. Distribution | 0.27 | 0.32 |
| View AP Invoice Find | 0.21 | 0.21 |
| Overview | 0.93 | 0.98 |
| Distributions | 0.20 | 0.20 |
| Customer Service | | |
| Create Service Request | 0.28 | 0.34 |
| Update Service Request | 0.29 | 0.40 |
| Close Service Request | 0.52 | 0.63 |
| Self Service | | |
| Create Cash Exp. Login | 0.22 | 0.32 |
| Submit Cash Exp. | 0.36 | 0.41 |
| Credit Card Expense Entry | 0.15 | 0.16 |
| Submit | 0.39 | 0.45 |
| Query Credit Card Expense | 0.21 | 0.26 |
| Create Project Timecard | 0.11 | 0.15 |
| View Employee Payslip | 0.25 | 0.34 |

Table 4a: Detailed Online Transaction Response Times

| | 2,100 Users | |
|------------------------------|-------------|-----------------------|
| | Avg. | 90 th % |
| Sales & Marketing | | |
| Create Proposal | 0.23 | 0.27 |
| Create Quote | 0.36 | 0.46 |
| Update quote | 0.20 | 0.32 |
| Place Order | 0.64 | 0.73 |
| Query Forecast | 0.15 | 0.18 |
| Query Forecast Details | 0.11 | 0.16 |
| Submit Forecast | 0.22 | 0.24 |
| Update Forecast | 0.12 | 0.18 |
| Update Forecast Details | 0.20 | 0.24 |
| Miscellaneous Trans. | | |
| AR Bill to Open | 0.22 | 0.21 |
| AR View Cust. Transact. Find | 0.35 | 0.43 |
| Aging | 0.20 | 0.26 |
| Acct. Summary | 0.17 | 0.21 |
| Acct. Details 1 | 0.18 | 0.21 |
| Acct. Details 2 | 0.49 | 0.66 |
| Line Items | 0.39 | 0.49 |
| Tax | 0.17 | 0.21 |
| Tr. Accounting | 0.18 | 0.21 |
| AR Cust. Sum. Open Address | 0.21 | 0.21 |
| Open 'Ship To' | 0.21 | 0.21 |
| FA Create | 0.22 | 0.21 |
| FA Query Asset | 0.16 | 0.23 |
| GL Create Journal Entry | 0.20 | 0.34 |
| GL Query J. E. | 0.17 | 0.21 |
| INV Insert | 0.80 | 0.87 |
| INV View Item Attributes | 0.23 | 0.27 |
| INV View Quant | 0.21 | 0.21 |
| Overall Avg. | 0.31 | 0.51 |

Table 4b: Detailed Online Transaction Response Times

50,000 order lines were processed in this test. Table 5 shows the processing time in minutes.

| 50,000 Lines | Order | Time (Min) | Order Lines per Hour |
|--------------|---------------------|------------|----------------------|
| | | | |
| | HVOP | 1.35 | 2,222,222 |
| | Pick Release | 4.48 | 669,643 |
| | Ship Confirm | 0.60 | 5,000,000 |
| | ITS | 3.05 | 983,607 |
| | Auto Invoice | 6.07 | 494,234 |
| | Revenue Recognition | 2.55 | 1,176,471 |
| | General Ledger | 4.63 | 647,948 |
| | Journal Import | 1.48 | 2,027,027 |
| | Posting | 1.63 | 1,840,491 |
| | Totals: | 25.84 | 116,099 |

Table 5: Order-to-Cash Batch Performance (2,100 Users)

10,000 employees were processed for the semi-monthly payroll in this test. Table 6 shows the processing time in minutes.

| 10,000 Employees | | Time (Min) | Employees per Hour |
|------------------|-----------------|------------|--------------------|
| | | | |
| | Payroll Process | 3.68 | 163,043 |
| | PrePayments | 0.38 | 1,578,947 |
| | NACHA | 0.05 | 12,000,000 |
| | Check Writer | 0.22 | 2,727,273 |
| | Costing | 0.32 | 1,875,000 |
| | Totals: | 4.65 | 129,032 |

Table 6: Payroll Batch Performance (2,100 Users)

SERVER PERFORMANCE

Figure 6 shows the average CPU utilization on the Database, App/Web and CM servers. The value shown is the average across the processors in the database server (a total of 16 cores) and the four processors (8 cores) in each of the three application servers and the Concurrent Manager server.

**Oracle E-Business Suite Benchmark
11.5.10 using Oracle 10g on HP ProLiant
DL585 and ProLiant BL685c Server Blades**

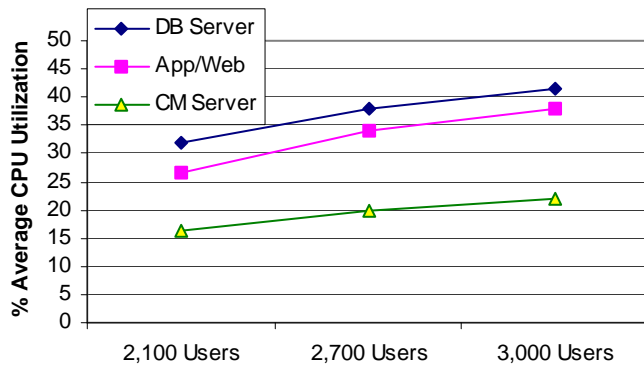


Figure 6: Average CPU Utilization

Each server scaled smoothly as users were added, keeping the batch load constant over the steady state period.

| Online Workload | % User | % System | % I/O Wait | % Idle |
|-----------------|--------|----------|------------|--------|
| DB Server 70% | 28.58 | 2.1 | 1.32 | 67.99 |
| App/Web 1 70% | 24.35 | 2.23 | 0.02 | 73.4 |
| App/Web 2 70% | 24.91 | 2.28 | 0.02 | 72.78 |
| App/Web 3 70% | 24.17 | 2.29 | 0.02 | 73.51 |
| CM Server* 70% | 16.04 | 0.27 | 0.02 | 83.66 |

Table 7: Average CPU Utilization Breakout

| Average GB Used | 2,100 Users |
|-----------------|-------------|
| DB Server 1 | 95.12 |
| App/Web 1 | 21.31 |
| App/Web 2 | 21.49 |
| App/Web 3 | 21.57 |
| CM Server | 3.71 |

Table 8: Average Memory Utilization Breakout

I/O PERFORMANCE

An EVA6000 storage system equipped with four disk trays was used for storage. The batch workload requires optimal I/O performance.

| I/O Performance | | 2,100 Users |
|-----------------------|------|-------------|
| Transfers/Sec | Avg | 50.097 |
| | Peak | 1899.83 |
| Writes/Sec | Avg | 43.776 |
| | Peak | 1899.5 |
| Reads/Sec | Avg | 6.320 |
| | Peak | 191.3 |
| Blocks Written/Sec | Avg | 1156.492 |
| | Peak | 53869.43 |
| Blocks Read/Sec | Avg | 84.542 |
| | Peak | 9339.2 |
| Avg Service Time (ms) | Avg | 2.083 |
| | Peak | 16 |

Table 9: Average I/O Utilization Breakout

DATA COMPOSITION DESCRIPTION

Major data components for the model under test are summarized in the following table.

| Application | Business Objects | Medium Model |
|-------------------|-----------------------------|--------------|
| TCA | Organizations | 500,000 |
| | Contacts | 1,000,000 |
| | Contact Points | 1,000,000 |
| | Accounts | 500,000 |
| | Account Sites | 500,000 |
| | Account Site Uses | 1,000,000 |
| Contracts | Contracts | 100,000 |
| Install Base | Instances | 500,000 |
| | Trackable Items | 5 |
| Items | Reserve - Items | 500,000 |
| HR | Managers | 400 |
| | Employees | 50,000 |
| | Payroll Users | 50,000 |
| | Users | 10,000 |
| | Credit Card Entries | 500,000 |
| | Supplier(s) | 5,000 |
| Assets | Asset Categories | 100 |
| General Ledger | GL Code Combinations | 1,000 |
| Sales & Marketing | Resources | 9,021 |
| | Resource Groups | 820 |
| | Resource Hierarchy Level(s) | 4 |
| | Sales Leads | 500,000 |
| | Campaigns | 1 |
| | Sales Territories | 8,201 |

Table 10: Data Composition

PATCHES

The following patches were applied to the benchmark environment on top of Oracle Applications 11.5.10.

| | | |
|----|----------|--|
| 1 | 4529484: | SUBMIT EXPENSE PERFORMANCE ISSUE |
| 2 | 4058603: | OIE.I ROLLUP PATCH #2 |
| 3 | 4282785: | PERFORMANCE: SERVICE REQUEST CREATION IS SLOW FROM THE SRTAB FROM CC |
| 4 | 4455883: | POOR PERFORMANCE SEARCHING SEVICE REQUESTS |
| 5 | 4564212: | AR AGING 4 BUCKET REPORT IS DOING FULL TABLE SCAN |
| 6 | 4345584: | UNABLE TO ENTER A LINE IN SALES ORDER FORM |
| 7 | 4605076: | EXCESSIVE EXECUTIONS FOR SPECIFIC PACKAGE |
| 8 | 4612749: | BUG FIXES FOR CS: OCT-05 PATCH |
| 9 | 4756197: | TOO MANY EXECUTIONS OF SELECT A.PERZ_DATA_ID, A.PROFILE_NAME...IN UPDATE |
| 10 | 4733725: | BUG FIXES FOR CS: DEC 05 PATCH |
| 11 | 5068932: | INV: EXCESSIVE PROFILE AND LOGGING CALLS IN PICK RELEASE |
| 12 | 4384590: | BACKPORT FOR BUG# 4287370 |
| 13 | 4070860: | ORACLE QUOTING ROLLUP 2 ON 11i.QOT.D |
| 14 | 4070199: | ORACLE ORDER CAPTURE ROLLUP 2 ON 11i.ASO.M |
| 15 | 5742459: | BR11510: QOT: GETTING JAVA.LANG.VERIFYERROR WHILE ACCESSING QUOTES |
| 16 | 4742368: | Create Inter-company AR Invoices Program - Poor Performance |
| 17 | 4599286: | 11510: ISUPPORT CONSOLIDATION PATCH AS OF SEPTEMBER, 2005 |

Table 11: Application Patches

APPLICATION SETTINGS

Database:

1. The database initialization parameters were set according to the MetaLink document 216205.1 "Database Initialization Parameters and Configuration for Oracle Applications 11i".

Order Management:

1. The profile option 'OM: Apply Automatic Attachments' was set to 'No'.
2. Price adjustment event at booking. "Book Order" was disabled.
3. The item identifier default type was changed to 'Internal Item Number'.
4. The setup parameters "Enable Freight Ratings" and "Enable Ship Method" were set to No.
5. Re-pricing was disabled at Book Order. 'Save Order Event' was disabled in the Pricing setup.
6. The profile option ONT_BYPASS_NOTIFY_OC was created and set to "Y".

Inventory:

1. The pick release rules were set to "Autocreate Deliveries".
2. Except 'serviceable items', all other items used in the benchmark were set as 'Non Trackable' through the Item Master form.

Tech. Stack Configuration:

1. Disable the nagle algorithm in protocol.ora by setting TCP_NODELAY=YES in \$TNS_ADMIN
2. Set the FORMS60_REJECT_GO_DISABLED_ITEM="0" environment variable
3. Set the FND_JDBC_PLSQL_RESET parameter to "true" in the dbc file

APPLICATION SETTINGS CONTINUED

Sales & Marketing:

1. Update 'Launch On Date' to current date if 3 months passed after Campaign Schedule created.
2. The profile options ASO: Calculate Price' and 'ASO: Calculate Tax' were set to "Manual".
3. The profile option 'ASO: Use Network Container' was set to 'No'.

Service:

1. Business event subscriptions were disabled.
2. For iSupport, the type of Alert bin was changed to Java.
Content Source Type : Java Object
Content Source Name:
oracle.apps.ibu.homepage.AlertBinRenderer

Receivables:

1. The scheduled "General Ledger Transfer" concurrent program was cancelled.

Payroll:

1. CHUNK_SIZE was set to 20 in PAY_ACTION_PARAMETERS table.

APPLICATION TUNING

Two additional indexes were created on table RA_CUSTOMER_TRX_LINES_ALL on columns interface_line_attribute1 and interface_line_attribute6

1. The index INV.MTL_ITEM_CATEGORIES_N3 was modified to have the columns in the following order.
MTL_ITEM_CATEGORIES(CATEGORY_ID,CATEGORY_SET_ID,ORGANIZATION_ID)
2. The sequence cache size for the following sequences were set to 10000:

INV.MTL_SALES_ORDERS_S,
ONT.OE_MSG_ID_S,
ONT.OE_SALES_CREDITS_S,
MRP.MRP_AP_REFRESH_S,
MRP.MRP_ATP_SCHEDULE_TEMP_S,
WSH.WSH_DELIVERY_ASSIGNMENTS_S,
WSH.WSH_DELIVERY_DETAILS_S
3. The snapshot logs were dropped on the following tables:
INV.MTL_MATERIAL_TRANSACTIONS
INV.MTL_RESERVATIONS
INV.MTL_DEMAND
OSM.AS_SALES_LEADS
4. The retention time of the following queues was set to 0:
APPLSYS.WF_REPLAY_OUT
APPLSYS.WF_REPLAY_IN
APPLSYS.WF_IN
APPLSYS.WF_OUT
APPLSYS.WF_DEFERRED
APPLSYS.WF_NOTIFICATION_IN
APPLSYS.WF_NOTIFICATION_OUT
APPLSYS.WF_JAVA_DEFERRED

APPLICATION TUNING CONTINUED

5. The index AR.RA_CUST_TRX_LINE_GL_DIST_N2 was dropped.
6. RA_CUST_TRX_LINE_GL_DIST_ALL, GL_INTERFACE, RA_CUSTOMER_TRX_ALL, RA_CUSTOMER_TRX_LINES_ALL, GL_IMPORT_REFERENCES, GL_JE_HEADERS, GL_JE_LINES, MTL_MATERIAL_TRANSACTIONS, MTL_RESERVATIONS, MTL_ONHAND_QUANTITIES_DETAIL, tables and their index were moved to the tablespace, locally managed, uniform size 10M
7. PAY_RUN_RESULTS, PAY_RUN_RESULT_VALUES tables and index were moved to the tablespace, locally managed, uniform size 20M.
8. Add index: oe_price_adjustments (list_line_id , list_line_type_code , updated_flag)
9. Add index: wfevents_u3 as wf_events (name,status,type,LICENSED_FLAG)
10. Add index gl_code_combinations_u2 (segment4,segment3,segment2,segment5,segment1, chart_of_acount_ids)
11. Decreased the polling interval and worker wait time for the Revenue Recognition job step within the Orders To Cash batch
12. Add index: fnd_random_stats(lock_id)

OPERATING SYSTEM TUNING

DATABASE OPERATING SYSTEM TUNING

1. The following kernel parameters were set in the `/etc/sysctl.conf` file:

```
kernel.sem = 250 32000 100 128
kernel.shmmax = 64424509440
kernel.shmmni = 4096
kernel.shmall = 15728640
fs.file-max = 6553600
net.ipv4.ip_local_port_range = 1024 65000
net.core.rmem_default = 262144
net.core.rmem_max = 262144
net.core.wmem_default = 262144
net.core.wmem_max = 262144
vm.nr_hugepages = 10253
```

2. The following parameters were set in the `/etc/security/limits.conf` file:

```
*      soft    nproc        20000
*      hard    nproc        20000
*      soft    nofile       130000
*      hard    nofile       130000
oracle -      memlock      100000000
```

3. Hugepages were enabled for the Oracle Database to use

OPERATING SYSTEM TUNING CONT.

APPLICATIONS OPERATING SYSTEM TUNING

1. The following parameters were set via `sysctl`:

```
net.ipv4.tcp_sack = 0
net.ipv4.tcp_timestamps = 0
net.ipv4.ip_local_port_range = 1024 65000
net.core.rmem_default = 262144
net.core.rmem_max = 262144
net.core.wmem_default = 262144
net.core.wmem_max = 262144
vm.nr_hugepages = 1089
kernel.shmmax = 4294967295
```

2. The following parameter was set in the `/etc/security/limits.conf` file:

```
oracle -      memlock      100000000
```

3. Large pages were enabled for Java

BENCHMARK ENVIRONMENT

HARDWARE CONFIGURATION

A Hewlett-Packard® ProLiant® DL585 G5 server was used for the database server. It was equipped with the following:

- 4 × 2.7 GHz AMD® Opteron™ Quad-Core 8384 processors (16 cores total), each with 2 MB of Level 2 cache and 6 MB of Level 3 cache
- 128 Gigabytes of Memory
- 2 × 72 GB internal disk drives attached to an embedded HP Smart Array P400 Controller
- 1 × HP Storage Works EVA6000 disk array attached to a single Storage Works 4Gb PCI-e Fibre Channel Controller for data and logs
- 3.98 TB raw disk space available for allocation. (56 × 72.8 GB)
- Approximately 468 GB of RAID 0 storage configured for this benchmark (data and logs)

Application Servers:

3 × HP® ProLiant® BL685c server blades were used as the application/web servers. They were equipped with the following:


- 4 × 3.0 GHz AMD® Opteron™ Dual-Core Model 8222 processors (8 cores total), each with 1 MB of Level 2 cache per core
- Total Memory: 32 GB.
- Network: Gigabit full duplex.
- 2 × 72 GB internal disk drives attached to an embedded HP Smart Array E200i Controller

Concurrent Manager Server(s):

1 × HP® ProLiant® BL685c server blade was used as a Concurrent Manager server. This system was equipped with the following:

- 4 × 3.0 GHz AMD® Opteron™ Dual-Core Model 8222 processors (8 cores total), each with 1 MB of Level 2 cache per core
- Total Memory: 32 GB.
- Network: Gigabit full duplex.
- 2 × 72 GB internal disk drives attached to an embedded HP Smart Array E200i Controller

Application Traffic Management Device(s):

| | |
|---|--|
|  | <p>1 × F5 BIG-IP Model 1500 Local Traffic Manager was used to distribute the LoadRunner traffic across the web and application servers.</p> <p>The F5 BIG-IP local traffic management system is specifically designed to manage local network traffic that comes into or goes out of a local area network (LAN). A commonly-used feature of the F5 BIG-IP system is its ability to intercept and redirect incoming network traffic for the purpose of intelligently tuning and distributing the network load between servers for scalability. In addition to the basic ability to balance the load across network servers, other functions include managing specific types of application traffic, monitoring and optimizing server performance, and enhancing the network security. For more information on the F5 BIG-IP system, see http://www.f5.com/products/big-ip/</p> |
|---|--|

Load Driver(s):

1 × HP® ProLiant® DL380 G4 server was used as the load driver. It was equipped with the following:

- 2 × 2.8 GHz Dual Core Intel® Xeon™ processors, each with 2 MB of Level 2 cache
- 6 GB memory

SOFTWARE VERSIONS

Oracle's E-Business Suite (E-Business Suite Kit) 11.5.10

Oracle10g™ 10.2.0.3 (64-bit)

Oracle Enterprise Linux 4 update 4 (64-bit) (on the database server)

Oracle Enterprise Linux 4 update 4 (32-bit) (on the application/web servers and Concurrent Manager server)

Hewlett-Packard® LoadRunner® 8.0

For more details on Mercury's LoadRunner, please refer to <http://www.mercury.com/us/products/performance-center/loadrunner/>

Apache WebServer 1.3.19 with JServ 1.1.2

Java™ 2 Runtime Environment, Standard Edition (version 1.5.0).

F5 Traffic Management Software BIG-IP LTM v9.2.2

Glossary and Acronyms:

ATP Available to Promise

BEE Batch Element Entries

HVOP High Volume Order Processing

OASB Oracle Applications Standard Benchmark

RAC Real Applications Clusters



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